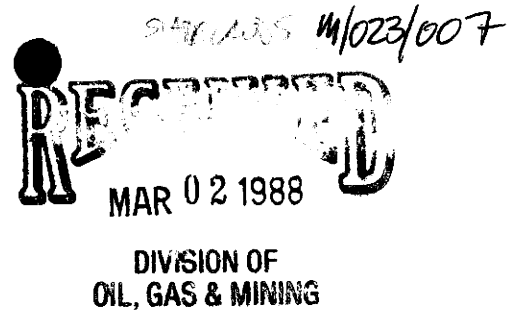




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DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

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February 29, 1988

Mr. Joseph C. Milbourne
North Lilly Mining Company
851 Traeger Street Suite 320
San Bruno, California 94066

Re: Tintic Project
Plan Review Comments

Dear Mr. Milbourne:

We have reviewed your 14 January 1988 response to our comment letter on the plans and specifications for this project. Normally when review comments are considered the plans and specifications are revised accordingly and submitted for further review. We have concerns that comment resolution by letter only may not resolve issues totally, however per our phone conversation and at your request we will proceed with the review of the project in this manner.

1. Reference 3.2

The secondary liner proposed does not meet the minimum requirements. For a secondary liner to be acceptable it must have the following requirements indicated in the plans and specifications.

- a. A minimum of twelve (12) inches of clay constructed in two (2) six inch lifts.
- b. Liner material must be verified to have an in place permeability of 1.0×10^{-7} cm per sec or less.
- c. Quality control procedures outlined to verify (a) and (b) above including the proposed frequency of testing.
- d. Other requirements as specified later in this letter.

3. Reference 3.2

We understand that drawing No. 13071/01 will be revised to show the spacing of the process solution collection system piping.

4. Reference 3.2.1

Before a construction permit can be issued the permeability rate of the secondary liner material must be established at 1.0×10^{-7} cm per second or less.

7. Reference 3.3
We concur that the design capacity of the process ponds must be adequate to contain the 100 year 24 hour storm event, a complete drain down of the leach pad, and the design snow melt.
9. Reference 5.1/5.2
As far as we can determine no references are made in either the plans or specifications to the leakage detection/collection system. The leakage detection/collection system is an important part of the liner system and must be included before a construction permit can be issued.
10. Reference 6.0
This comment is now deleted being adequately covered due to the expansion of comment No. 1.
11. Reference 7.1
The concept of pumping the contents of a leaking process pond into the other process pond until repairs are completed is acceptable. However the operating levels of these ponds must be specified such that there will be adequate capacity to do this at any time during the year. These design operating levels for the ponds must become part of the operating conditions specified in the construction permit.
13. Reference 7.3
The facilities shown in Figure B.6 to contain process plant spills are adequate except that information for containing spills at the acid storage facility Figure B.5 should be provided.
14. Reference 7.3
We understand that the Bureau of Water Pollution Control will be notified within 24 hours by phone and within 7 days by letter if leakage is detected. This requirement must be contained in a contingency plan which will establish procedures which will be followed if leakage is detected. The contingency plan must also state the test procedures which will be used to verify leakage and that the leaking facility will be shut down and decommissioned unless the leak can be repaired or isolated.
15. Reference 7.3
We understand that requirements for the proper disposal of contaminated materials will be included in the construction plans and/or specifications prior to their being approved.
16. Reference 8.0
The procedures set forth in Attachment B for collecting the leached ore samples appears adequate however minimum criteria which must be attained shall be that outlined in our letter of 14 December 1987, comment No. 16. The procedures and criteria for close down must be submitted for review and approval prior to the issuance of the construction permit. A bond which may be included in the oil, gas and mining bond, will be required to insure that closure requirements are met.

25. Reference Tech. Spec. 7.2
A leak detection system will be required.
26. Reference Tech. Spec. 8.1
Differential settlement beneath a liner system can create stress in, and failure of flexible membrane liners. Prior to the issuance of a construction permit the integrity of fill areas beneath the leach pad liner system must be established by including the design consultants construction procedures and quality control assurances in the plans and specifications.
27. Reference Tech. Spec. 9.0
The reference "insofar as practical, the material shall be brought to the proper moisture content prior to placement in the fill", gives us serious concern whether the soil will be brought to the proper moisture content so these facilities will be constructed to function satisfactorily throughout the life of the project. Therefore an acceptable range of moisture contents around the optimum moisture content must be specified and achieved during construction.
28. Drawing 13701/02
We understand that a ditch or a berm will be shown on this drawing sufficient to divert the design storm event runoff around the pregnant and barren solution ponds.
29. We understand that drawing 13701/03 will be revised to include acceptable responses to comments (a) through (h) and that this revised drawing will be submitted for review prior to the issuance of the construction permit.
30. Drawing 13701/01
 - a. The routing of all process piping shall be shown on this drawing along with adequate provisions for containment of all leakage or spillage.
 - b. Provisions shall be made to control sediments from storm water runoff for all disturbed areas which will not be contained on site.

As we have previously requested copies of chemical analysis of water from wells down gradient from the site and also a water sample analyzed for cyanide from your water supply well must be submitted.

The following are the requirements for the heap leach pad liner system for the North Lily project. The liner system shall beginning at the top consist of:

17. Reference 8.0

We concur with the proposal for neutralization verification of the spent ore which we understand is as follows:

- a. The spent ore will be sprayed with a neutralizing agent until the liquids recovered consistently meet the criteria specified in comment No. 16 of our 14 December 1987 letter. To be considered neutralized two (2) consecutive samples spaced four (4) hours apart must meet the neutralization requirements.
- b. The spent ore pile will then be sampled according to your criteria stated in Attachment B which was included with the 14 January 88 submittal. The only exception being that the acceptable minimum neutralizing criteria shall be that indicated in (a) above.

18. Reference 8.0

The neutralized spent ore pile must be covered by at least nine (9) inches of impervious material which will be graded so precipitation falling on the pile will run off. Also surface runoff should be diverted around the pile.

19. Reference 8.0

We understand that requirements for closure of the process ponds including neutralization, removal and proper disposal of slimes, precipitants, solids etc., will be included in the criteria for close down which must be submitted for review and approval prior to issuance of the construction permit. Also reference must be made in the close down criteria as to the disposition of the liner.

20. Reference Tech. Spec. 5.3

We will evaluate this comment further upon receipt of the separate letter referenced.

21. Reference Tech. Spec. 6.2

We will evaluate this comment further upon receipt of the separate letter referenced.

23. Reference Tech. Spec. 6.3

It shall be a condition of the construction permit that the Bureau of Water Pollution Control be notified two (2) days prior to commencing geomembrane installation so appropriate inspections can be coordinated.

24. Reference Tech. Spec. 6.4

We understand that the construction requirements for preparing the pipeline ditch surface to properly support the liner will be included in the plans and/or specifications prior to the issuance of the construction permit.

1. A process solution collection system must be located immediately below the ore and immediately above the primary (flexible membrane) liner. It must be designed to convey the design leach flow with a maximum allowable head of twelve (12) inches. These design flow values including maximum application rate and maximum allowable head on the flexible membrane liner must be submitted for review and will become part of the operating conditions of the project. The system must consist of a high hydraulic conductivity media (Geotextile, drain net, gravel etc.) and a pipe collection system. If gravel is to be used it must be rounded and the maximum size shall be limited so the flexible membrane will not be damaged or a sand cushion must be provided. Provisions must be made to prevent clogging of the process solution collection system with fines. The solution collection system piping must be of adequate strength to withstand the weight of trucks and ore loaded upon it.

In addition, the solution collection system must have a continuous gravity exit so the fluids will not pond on the flexible membrane liner. Pipe of suitable material must be installed at designated locations in the heap to monitor the process solution head, when start up operations begin. These measurements must be submitted to the Bureau of Water Pollution Control.

2. The flexible membrane liner (primary liner) proposed for the leach pad is acceptable and must meet the following requirements. The flexible membrane must meet the minimum requirements of the National Sanitation Foundation (NSF) standard No. 54.
The flexible membrane must be protected above by the process solution collection system and below by the secondary liner. The liner must be installed at a minimum slope of 3 percent to provide a gradient for the process solution to flow towards the collection pipes. A duration liner/waste compatibility test must be conducted for all constituents in the process solution which will come in contact with the flexible membrane. Procedures indicated in most recent ASTM and EPA test methods will be acceptable if conducted over a reasonable period of time. If field seaming will be made with different or modified materials from the geomembrane this must be considered in the testing procedure. At the conclusion of the test a summary report must be submitted for review indicating the constituents tested, the physical properties of the liner that were evaluated, and the conclusions drawn. An operational condition of the permit will be that during the life of the project only those constituents tested for will be used in the process, unless additional compatibility testing is conducted. All flexible membranes, geotextiles, drainage nets etc. must be handled, stored and installed according to the manufacturers recommendations. All field seams must utilize the shingle effect when appropriate and be made according to the most stringent requirements of the manufacturer and must be tested as specified in ASTM Standard Practice D4437-84. Flexible membrane liner specifications must include as a minimum the following:

- a. type of liner material.
- b. thickness of the liner.
- c. proposed quality assurance procedures for installation.
- d. proposed quality assurance procedures for field seaming.

The design, construction and quality assurance must be certified by a registered professional engineer to meet the State requirements for a heap leach system. Appropriate assurances and guarantees to support this certification must be sent to the Bureau of Water Pollution Control. The quality assurance procedures proposed to insure that the flexible membrane liner will be constructed to fulfill the intent of its design must be submitted for review.

Weather conditions specified by the manufacturer within which construction of the flexible membrane liner will be allowed such as wind speed, precipitation, temperature range and soil moisture content must be included in the specifications. Based on this information the months when these conditions would generally prevail and construction would be allowed should be identified.

3. The Secondary liner must consist of at least twelve (12) inches of clay material with a maximum permeability rate of 1.0×10^{-7} cm per second laid in two (2) 6 inch lifts.

If bentonite addition or other additives is required the amount needed to achieve the 1.0×10^{-7} cm/sec permeability must be based on the most coarse soil from the site to obtain the upper bound clay requirement. The following information for constructing the clay secondary liner with the addition of Bentonite must be submitted for review:

- a. the amount of bentonite required.
- b. proposed mixing procedure (agricultural disk, rototiller or pug mill)
- c. moisture content and the density at which the lowest permeability occurs.

The design and construction Quality Assurance program for each lift of the secondary liner and the secondary liner foundation must be submitted for review. The foundation must be stable for the design height of the heap leach pile with limited differential settlement so the integrity of the liner system will not be compromised. The potential for geochemical reaction between leaching solutions and the clay material which might alter the properties of the clay must be evaluated.

4. The leakage detection/collection system located beneath the secondary liner must consist of a material with a permeability rate of 1.0×10^{-2} centimeters per second or greater laid on an acceptable base material with a permeability rate of 1.0×10^{-5} centimeters per second or less. The leakage detection/collection system must contain perforated piping which drain to the leakage collection sump. The leakage detection/collection system must cover the entire area beneath the heap leach pad. The head on the leakage required to cause the leakage to flow along the interface must

Letter to Joseph C. Milbourne
Page Seven

be minimal. Piping must be compatible with the leakage fluids and must be of adequate strength to withstand the weight of the ore etc. to be loaded upon it. The system must be designed so it will not be contaminated by clay material when the secondary liner is constructed above it.

Once the site is excavated and prior to constructing the foundation for the liner system, an inspection must be conducted for springs, seeps etc. which may adversely impact the liner system. If any springs, seeps etc. are discovered a proposal for diverting this water must be submitted to the Bureau of Water Pollution Control for review and approval prior to resuming construction.

The equipment, procedures and techniques which will be used to place the ore on the liner system must be submitted for review.

As discussed in the predesign conference the domestic wastewater system must be approved by the Central Utah District Health Department if flows will be less than 5000 gallons per day.

Also per our 14 December 1987 letter and our phone conversation of 22 February 1988, copies of all correspondence and submittals on this project should also be sent to:

Mr. Roger Foisy
Central Utah District Health Department
201 East 500 North
Richfield, Utah 84701

This will insure that local officials are informed about the project.

Please call me at 538-6146 if there are any questions.

Sincerely,



UTAH WATER POLLUTION CONTROL COMMITTEE
Don A. Ostler, P.E.
Executive Secretary
Bureau of Water Pollution Control

CGD/lme

cc: Mr. Don Poulter, Steffen, Robertson & Kirston
Mr. Roger Foisy, Central Utah District Health Dept., Richfield
Mr. Bruce Hall, Central Utah District Health Dept., Nephi
Mr. Dave Wham, Oil, Gas and Mining

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